

Lightning flash density prediction with the WRF model

Yoav Yair^{1*}, Barry Lynn²

¹The Open University of Israel, ²Weather-it-is

The Lightning Potential Index (LPI; Yair et al., JGR 2010) embodies the potential for charge generation and separation that leads to electric field build-up and lightning discharge. The LPI is calculated from model simulated updraft and cloud microphysical fields. It was designed for predicting the potential of lightning occurrence in operational weather forecasting models, and can possibly be used to improve short-range forecasts of heavy rain. The index was used in the EU FLASH project (Price et al., 2009) to estimate the potential for flash floods. It is modified to be model grid-scale transparent between 1 and 4km (the approximate upper limit of explicit microphysical weather forecasts). Several case studies of thunderstorms in the Mediterranean region, show that the modification appears to work quite well, and that LPI can be calculated on both an extremely high resolution research-grid (i.e., 1.33km) and high resolution (i.e., 4km) operationally compatible forecast grid. Analytical expressions are presented to use the LPI to predict the hourly lightning flash density.

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